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ABSTRACT

Recent research by Smith and Glass indicates that academic achievement is often correlated with class size. Findings from the Beginning Teacher Evaluation Study suggest that teachers can do a better job with smaller classes partly because they are able to individualize instruction. Yet the possibility of reducing class size significantly is fiscally impossible in most school districts, and small reductions do not produce enough achievement gain to make them worth the increase in cost. Less expensive methods to reduce group size or the adult-student ratio include teacher aides, parent and community volunteers, a staggered schedule, "pulling out" students into special labs or centers, team teaching, extended-day programs, and special support teams. Complex class size issues may be raised by student proficiency or competency standards, mainstreaming, and voucher programs. Upcoming research will provide additional insights and new avenues for inquiry and change. (Author/JM)

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IMPLICATIONS OF CLASS SIZE RESEARCH

Pamala Morgan Noli

The issue of class size has been debated and discussed for decades in research journals, state legislatures, board rooms, the superintendent's office and across the coffee table in teacher's lounges. Depending upon the seat in which one sits, the bias of the arguments is quite different. Members of the Tax Payers Association and some business managers recall, with fondness, the bygone days when a strict but kind task-master taught a class of 45 children and everyone learned the multiplication facts and the capitols of all 48 (or was it 13?) states. Teachers, on the other hand, intuitively know that they can do a better job with 25 students than with 45. Until the Smith and Glass (1978) meta-analysis, research offered little help in bridging the extremes in beliefs due to the apparent inconclusive findings in the area.

Regardless of the lack of empirical evidence, state legislatures and school boards recognized that there were certain class size maximums, beyond which effective teaching and learning would be substantially jeopardized. To insure compliance with class size statutes, laws have been enacted that bring heavy financial penalities against school districts which exceed the limits. Never-the-less, the debate goes on. Teachers and building level administrators contend that the maximums are still to high and/or do not extend to high enough grade levels; financial managers reiderate that reducing class size by even one student across all classrooms in a district would cost a fortune. Both sides are correct and therein lies the dilemma.

Why Class Size Makes a Difference

Members of the educational community are quite adept at rationalizing research findings, even when they don't make common sense. The seeming lack of strong positive correlations between class size and student achievement and attitudes is the case in point. We reasoned correctly that smaller class size would not make a difference unless teachers capitalized on the advantage by personalizing instruction to a greater degree. We concluded, perhaps incorrectly, that teachers did not change their modus oprendi when assigned fewer students and thus the inconclusive findings. The Smith and Glass (1978) work makes us reconsider the latter position. One must infer from their graphs on pages IV, 36, 37 and 41 that teachers did organize and instruct differently as class size decreased, particularly when the ratio approached 1:12.

The question then is what might teachers be doing differently that would account for the achievement gains? Cahen and Filby's recent research provides us with some interesting insights into the changes made by 5 teachers when their classes were

reduced in size. I would like to offer a few additional speculations based on findings of the Beginning Teacher Evaluation Study (BTES). This multi-year study of teacher effectiveness identified teaching processes which were related to student achievement, all of which could be enhanced by small class or group size.

Fisher, et al (1978), in the final report of the BTES, enumerates these processes. One finding relates to the teacher'a accuracy in diagnosing student levels and another refers to the teacher's ability to prescribe accordingly. Assuming that a given teacher has the skills to diagnose and prescribe, it is reasonable to assume that s(he) will be able to perform these functions in greater depth and with more accuracy with 15 students than with 35. Two major reasons for this are apparent. There are only so many hours in a day and the sheer mechanics of diagnosis, prescription and the recording thereof, are extremely time consuming when they are attempted with large numbers of students. Secondly, accurate diagnosis is dependent on knowing each child very well a process which transcends the information a teacher might rapidly gather from paper and pencil instruments. It is extremely difficult to get to know each child's likes, dislikes, talents, attitudes, needs, modalities and skill strengths and weaknesses when one is accountable for 30 or more children. In a class of 15 or fewer, it is quite likely that the teacher would not only be able to diagnose all of these areas, but s(he) would also be able to adjust instruction and provide materials that would meet the needs and strengths identified.

More substantive interaction between the student and instructor and academic feedback are two other BTES findings. Traditionally, teachers have broken classes into 3 to 5 reading groups to accomodate different achievement levels and to have a chance to interact and provide feedback in a more intimate structure. In large classes, however, the time a teacher can spend with one small group may be as short as 15 minutes per day, hardly an adequate interface to result in higher achievement.

The BTES also found that more frequent reprimands for inappropriate behaviors were negatively associated with student learning. Almost any teachers will attest to the fact that fewer children results in fewer discipline problems that must be attended to. The less time a teacher must spend on behavior modification the more time s(he) has to teach.

A cooperative classroom wherein students take responsibility for their learning and help their peers was also found in the BTES to correlate with student achievement. When class size is large, teachers often discourage children working together simply because it produces a distractively high noise level. Independent inquiry and self directed centers appear less frequently as class size increases due to the difficulty of monitoring diverse activities. As class size decreases, teachers often feel freer to create environments which enhance these variables because their fear of losing

control is proportionally diminished.

The major findings of the BTES relate to what students do with their time. It was found that the percentage of time that reading and mathematics tasks were performed with high success is positively associated with student learning. This finding relates back to the earlier diagnosis/prescription discussion but also extends into the domain of mastery learning. Children cannot experience success with a given criterion until s(he) has mastered the skill. Teaching to mastery, according to Bloom (1973), is a small group activity which requires time, appropriate materials, and close teacher interaction and direction. The size of the class or group set definite parameters on how much mastery learning (high success) a child may experience.

The most discussed finding of the BTES is that the proportion of allocated time that students are engaged is positively associated with learning. This is not a new idea and similar findings were reported by Carroll (1963), Bloom (1976), Stallings and Kaskowitz (1974), and Rosenshine and Berliner (1978). Keeping students on task is a function of direct instruction, appropriate materials, and monitoring. The smaller the class size or adult:student ratio, the higher the probability that students will be closely monitored and thus remain engaged in the tasks assigned. Unmonitored seatwork was found to be negatively correlated with student achievement, as one might expect but unmonitored seatwork is a common occurance in most elementary classrooms because a teacher cannot work with one group of 10 children and effectively monitor the independent activities of 20 others. The alternative is whole class instruction wherein adult:student ratio is 1 to 30 or more. When the teacher must resort to whole class instruction to insure high task engagement, s(he) may be sacrificing a large amount of his/her ability to diagnose, prescribe, provide academic feedback, and frequently interact with each pupil. Most teachers faced with large classes strike some type of reasonable compromise.

Smith and Glass' (1979) refer to teacher satisfaction as it relates to class size. The graph on page 32 illustrates a dramatic increase in teacher satisfaction as class size decreases. I do not believe, as some would contend, that this is a result of having an easier job because there are fewer children. In fact, just the opposite may be true. As class size decreases, fewer compromises must be made. Teachers undertake more diagnosis, more prescription, and intensify many of the other things previously mentioned. They are motivated to try creative and innovative procedures they couldn't even consider with large groups. They are less anxious about such concerns as potential or excessive off-task behavior. Another contributor to teacher satisfaction when class size is small is that they <u>believe</u> that their students will achieve more. This belief results in high expectations, and as Rosenthal (1968, 1973), Beez (1970), Nash (1976), and Braun (1977) have shown, high teacher expectations may

result in high student achievement which, in turn, is satisfying. Satisfaction is a worthy goal unto itself. Fenstermacher (1974) contends that teacher satisfaction combined with pupil and parent satisfaction, "should be conceived as a criterion for the successful pursuit of any educational activity undertaken in schools." (p. 215). If teachers are exclusively dissatisfied with their working conditions, can we expect educational excellence?

Reducing Group Size

The possibility of reducing class size to 15 or less across the board is fiscally impossible in most school districts and dropping class size from 30 to 28 is not warranted when one considers the costs against the small achievement gains illustrated by Smith and Glass (1978). Therefore, this discussion will focus on a few ways that group size and/or adult pupil ratio can be decreased.

Since the advent of categorical aid funding, para-professionals (aides) have been hired to reduce the adult pupil ratio in many classes. Although some research such as Samuels and Edwall (1976), Kean (1976), and Madden, et al (1976) casts doubts upon the adviseability of using adies for direct teaching, their value as monitors and clerical assistants goes without question. As previously indicated, the monitoring function is critical in that it frees the teacher to work with small groups with the assurance that the others will be kept on-task and that their questions will be answered.

Parent volunteers and community resource persons are additional adults whose presence can reduce the ratio. Often times, the function of the parent may be similar to those of the paid aides, but in some cases they are used for direct instruction in certain specialty areas in which they are particularly skilled or trained. In a similar vain, people from the community are asked to make large group presentations in their area of expertise, freeing the teacher to work with small groups in other areas. Schools fortunate enough to be in close proximity to a college or university capitalize on the availability of student teachers or artists and musicians on fellowships which advise public service.

One of the most common means of reducing group size for reading instruction is the "staggered" or "slip" reading schedule. In this program, half of the children come to school at say 8:30 and receive their reading instruction until 9:30 when the rest of the class arrives. The late arrivees receive their reading instruction the last hour of the day, after the morning group goes home. The major obstacle to the implementation of this type of program is bussing when the school attendance area is large geographically. The research currently being undertaken by Filby and the Far West Laboratory staff in this area should provide far greater information about the effectiveness of "staggered" reading than we have had in the past.

"Pull-out" programs are another organizational alternative to facilitate the reduction of group size. Some schools enjoy the availability of mathematics labs, reading labs, and separate libraries. Under the supervision of one or more resource teachers, students are sent out of the regular classroom to take advantage of the benefits offered, leaving the classroom teacher with a smaller group size. In schools where additional rooms do not exist but resource teachers do, the latter may work in the classroom, providing direct instruction to one or more small groups of children while the regular teacher does the same. I'm aware of one elementary school which hired a physical education specialist to pull one third of each class daily. This provides the children with an excellent PE program, reduces the class size by one third for that period each day, and frees the teacher from the PE responsibility, adding at least 20 minutes a day to the teacher's instructional time with children in the classroom.

The teachers and resource teacher in the school at which I work wrote materials and constructed learning centers which are utilized in the cafeteria during the morning reading period. One third of each primary class comes to the multi-purpose room which is supervised by the resource teacher and a number of parent volunteers. It is not easy to set up and take down seven to ten learning centers daily, but the staff feels that it is worth the extra effort to reduce the class sizes from 30 to 20 for reading instruction.

Team teaching is often utilized to make possible small groupings. As an example, two teachers and two aides with 60 pupils might organize a number of different ways over the teaching day. At some periods, one teacher might take 30 to 40 students for large group activities such as music, art, social studies films, or PE, leaving the other teacher and two aides with less than 30 pupils (10:1 ratio) for reading or mathematics. Of course, open space environments lend themselves more to such flexible scheduling, but they are not requisite.

Extended day kindergartens are relatively common in California. Although there are many variations on the theme, the concept involves lengthening the school day, for certain groups of children, from normal dismissal to the primary or even upper grade dismissal time. Some teachers choose to keep 1/5 of the class each day (about 6 children per day). Others prefer to hold 1/2 of the class over into the afternoons Monday and Tuesday and alternate the other half on Wednesday and Thursday, (few kindergarten teachers can last into the afternoons with children on Fridays). In a similar vain, primary teachers extend the school day for small groups of children with similar needs, shifting the composition of the groups according to diagnosed strengths or weaknesses, were it not for contract restrictions and the cost of additional busing, the notion of extended days for small groups might be a more wide

spread practice; one which could be incorporated by upper grade and secondary schools as well as primary and kindergarten grades.

Many schools consider first grade to be the most critical of all the years of schooling. To create small first grade group sizes for part of each day, kindergarten-first grade split classes are created. In this organizational pattern, half of the class is made up of kindergarteners and the other half is first grade. The teacher instructs in small groups and/or stations in the morning. After the kindergarten children go home at noon, the teacher is left with her first graders (16 or fewer children) for the remainder of the day.

Good setting activities by individual elementary schools often result in the identification of reading as the highest priority. To reduce the group size for just one period a day, some schools use all credentialed persons in the building to teach reading including the principal, vice principal, resource teachers, nurse, counselor and so on. Of course, this requires a good deal of inservice training for the staff members who normally do not provide direct instruction, but the results of such a total school commitment and the smaller group sizes made possible, have a powerful impact.

Another mode of reducing group size for a single subject in schools which receive categorical aide funding is to create a reading support team which provides direct instruction during the reading period. In this plan, a team of say one reading resource teacher and 4 highly trained aides join the classroom teacher each reading period, thus creating a 5:1 student/adult ration. By staggering the reading periods throughout the day, the team can work in as many as 4 classrooms. Unless the funding level of the school is extra ordinarily high, the implementation of this type of system usually requires that the traditional concept of one aide for each classroom be abandon in favor of the team approach.

Tutoring in the classroom can also result in smaller group sizes. Various options exist including multi-age grouping wherein younger students are helped by their older classmates; cross-age tutoring programs which utilize older students from other classrooms or other schools; and parent volunteers.

School districts experiencing declining enrollment and the consequent release of permanent teachers, may want to avoid the trauma therein by relating them as team teachers. By staggering reading and/or mathematics periods throughout the school day, one such teacher could reduce the group size for a given subject in as many as four rooms each day. If we are to take the meta-analysis seriously, money could not be better spent.

In a like vain, schools receiving compensatory education funds might consider spending larger porportions of their monies on certificated teacher who would

provide direct instruction to small groups. Legal considerations such as "above and beyond services" and possible segregation would have to carefully considered in any such endeavor.

Finally, and most radically, the suggestion was made by one of my colleagues that we simply split each class in half and have 15 students come for the first 3 hours and the other 15 come for the last 3. Aside from the legal problems involved, I asked teachers what they thought of the idea. In general, they agreed that most students would probably make greater achievement gains in reading, mathematics and language under those conditions, but that that is all that they would learn. The question was clearly whether or not we would be willing to sacrifice the balanced curriculum to attain higher achievement in the "basics". If parental discontent with the public school system continues to raise, perhaps the question should be left up to them.

Far West Laboratory will be undertaking survey and interview research during the next year which will attempt to identify the various organizational alternatives currently being implemented to reduce group size. Their final report should provide practioners with a wide variety of tested alternatives which will assist schools which wish to formulate similar reduction plans.

Issues

Proficiency standards in the basic subjects have become common requirements for graduation from high schools in many states. California, among others, requires minimal competency assessment at earlier grades as well. Let's assume that the goal of these programs is to raise the preformance of the below grade level child to some point approximating the 50th percentile. If we transcribe the Smith and Glass achievement curve down to a point which would reflect a child in a class of 30 who was achieving at the 25th percentile, it is readily apparent that s(he) would need to be placed in a class of 5 or less to attain achievement commensorate with the mean. Is it feasible to lower class or group size to this extreme?

Public Law 94-142, the Education for All the Handicapped Act, is in its implementation year. When handicapped students are mainstreamed into regular classrooms, should they be counted as just one more additional body, or should they be considered as the equivalent of two or more "normal" students when considering class size? The argument of many is that because of the special needs of these children and the time required of teachers to meet those needs, consideration should be given to the reduction of the size of the classes into which the special child will matriculate.

Both of the above raise additional class size issues. If instructional groupings are to be reduced for children with special needs, where will additional funds

be found? If additional funds are not forthcoming, which students will be assigned to larger classes to make smaller classes possible? There are those who would respond to the last question by suggesting that high achieving children could probably do just as well in classes of 40 or more students, but much more study would have to be done before one could have confidence in that claim. Advocates of the mentally gifted and talented child would contend that they too are "special" and deserve the benefits of small classes. They would argue that the gifted child is the hope of the future and should be afforded the maximum opportunity the system can provide for their growth. And what about the "average" child, the backbone of America? Are we willing to put him/her in a class as large as 40 or more and see him/her drop below the 50th percentile?

Let us assume, for the sake of discussion, that new money will become available to finance the creation of small classes for children with special needs. Will the creation of such classes result in a separation or segregation that is counter to the intent of prevailing laws? Will we find a higher percentage of PL 94-142 children in certain classes than would normally be expected? Will the minimal competency classes be primarily composed of the children of the poor and deprived? Will the mentally gifted classes evolve into an elitist group, separating them from other children who they might help to stimulate?

The voucher initiative which may reach the California voters in June of 1980 raises additional class size issues. At the outset, it would seem that this initiative would be the logical vehicle through which schools based on smaller classes could be created. Although the initiative states in section 7 that every independent or family choice school has the authority to set its enrollment limit at each grade level, it later mentions that if public schools become over crowded, children may be chosen by lot to attend independent public or family choice schools with "available space." If "available space" is defined within the context of the class size maximums established by the school, there should be few problems in this regard, but if the phrase refers to the number of students who could conceiveably fit into the physical environment, the concept would be in considerable jeopardy. Since the initiative stipulates that independent public and family choice schools would receive vouchers equivalent to 90% of the amount of money allotted to public schools, the small class size school would start with 10% less money than its public school counterpart, per capita. Add to that the reduced income based on fewer children per class, and the problems of the alternative school are compounded. Will this school have to offer lower salaries and thus attract less qualified teachers? Will this school have to rely on a curriculum based on very inexpensive and less than adequate materials? And conversely, if the alterantive schools wish to offer competitive salaries and high quality curriculu, will the tendency be to overload classes to generate the

the necessary capitol?

These are just a few of the interesting issues which are generated by the investigations into class size. I am confident that the work being carried out by the Far West Laboratory will give us additional insights and suggest new avenues for inquiry and change.

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